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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019/2020

HMM1011 – BASIC MICROBIOLOGY
(All sections / Groups)

28 FEBRUARY 2020
3.00 p.m. – 5.00 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 4 pages with 5 Questions only.
2. Answer **ALL THE QUESTIONS**. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers **clearly and neatly** in the Answer Booklet provided.

QUESTION 1

(a) Name the function of the following structures: [2 marks]

- Glycocalyx
- Fimbria
- Flagellum
- Endospore

(b) What is negative staining and why is it used? Give TWO examples of negative stain. [3 marks]

(c) In the lab, how do we determine if a bacterium can ferment lactose? [2 marks]

(d) Handwashing with soap and water has been considered a measure of personal hygiene for centuries and has been generally embedded in religious and cultural habits. Nevertheless, the link between handwashing and the spread of disease was established only two centuries ago. Which physician proposed the practice of handwashing to prevent infectious disease from spreading in hospitals? How did he/she make his discovery? [3 marks]

QUESTION 2

(a) How do we classify viruses? [1 mark]

(b) What is the difference between a mold and a yeast? Is *Penicillium* a mold or yeast? Is *Candida albicans* a mold or yeast? [2 marks]

(c) Your young brother found himself confused with the terms “helminths”, “nematodes”, “trematodes” and “cestodes”, when he was flipping through your microbiology text book. Please explain the four terminologies in simple English. [2 marks]

(d) Algae are complicated. Despite the fact that some can be harmful, algae have been proven to be beneficial to our use. Indicate THREE beneficial uses of algae. [3 marks]

(e) Until recently, archaea and bacteria were both grouped together into a kingdom called Monera. It was only in the late 1970s that the three-domain system of classification was proposed. This split all life into three domains: archaea, bacteria, and eukarya. Why were archaea and bacteria grouped together as Monera earlier? On what basis have biologists determined that they should belong to different domains later? [2 marks]

Continued...

QUESTION 3

(a) Define the following: [3 marks]

- i. Halophiles
- ii. Thermophiles
- iii. Psychrophiles
- iv. Acidophiles
- v. Barophiles
- vi. Extremophiles

(b) What is the major difference between an enrichment culture and a selective culture? [2 marks]

(c) In terms of oxygen requirements, what type of organism would most likely be responsible for a foodborne illness associated with canned foods? Why? [1 mark]

(d) Most of the infectious diseases are caused by bacteria. Infections caused by bacteria can be prevented, managed and treated through anti-bacterial group of compounds known as antibiotics. How do antibiotics work? Name at least FOUR ways. [2 marks]

(e) Prior to the introduction of pasteurization in the 1930s, all milk was consumed raw in its natural, unprocessed state. Raw milk advocates argue that it has superior health and nutritional benefits and that pasteurization eliminates these advantages. Is raw milk safe to drink? Why? [2 marks]

QUESTION 4

(a) What are virulence factors? Give FOUR examples. [3 marks]

(b) While sexually transmitted diseases (STDs) affect individuals of all ages, STDs take a particularly heavy toll on young people. CDC estimates that youth ages 15-24 make up just over one quarter of the sexually active population, but account for half of the new sexually transmitted infections that occur in the United States each year. Name at least FOUR types of STD. How would you protect yourself from STD (name at least TWO ways)? [3 marks]

(c) The bacterium that causes Hansen's disease (leprosy), *Mycobacterium leprae*, infects mostly the extremities of the body: hands, feet, and nose. Can you make an educated guess as to its optimum temperature of growth? [1 mark]

(d) Athlete's foot, also known as tinea pedi and ringworm of the foot. Briefly describe the infection in terms of the etiology, treatment, and prevention. [3 marks]

Continued...

QUESTION 5

(a) State the type of defense (as first, second, or third line) and the function of the following: [6 marks]

- i. B cells
- ii. Complement system
- iii. Inflammation
- iv. Skin
- v. Sweat and oil glands of the skin
- vi. T cells

(b) How can you explain that the same antibodies found in an infant's body are also present in the infant's mother? [1 mark]

(c) What function does the diversity of the variable region of an antibody help it perform? [1 mark]

(d) Suppose a series of genetic mutations prevented some, but not all, of the complement proteins from binding antibodies or pathogens. Would the entire complement system be compromised? Why or why not? [1 mark]

(e) A person given a flu vaccine in November comes down with a severe case of influenza in January. What can you conclude about the flu vaccine and cross reactivity? [1 mark]

End of Paper